

MISCELLANEOUS.

A new case of Care of the Brood in Holothurians. (Provisional Communication.) By Prof. HUBERT LUDWIG, of Bonn.

THE number of sea-cucumbers which care for their brood known up to the present time amounts to seven, all of which belong either to the Dendrochirotae or to the Synaptidae. One species among them—*Phyllophorus urna*, Grube—utilizes the body-cavity as a brood-chamber, while in the case of *Cucumaria crocea* (Lesson) and *Psolus ephippifer*, W. Thomson, the eggs undergo their development upon the dorsum of the mother; in *Cucumaria levigata* (Verrill) and *Cucumaria glacialis*, Ljungman, on the other hand, development takes place in special ventral brood-pouches (invaginations of the integument). With the exception of the Mediterranean *Phyllophorus urna*, all these Dendrochirotae are arctic (*Cucumaria glacialis*) or antarctic forms (*Cucumaria crocea*, *C. levigata*, *Psolus ephippifer*). In the case of the two Synaptidae which care for the brood—*Synapta vivipara* (Erstedt) and *Chiridota rotifera* (Pourtalès)—both of which belong to the West-Atlantic marine region, the body-cavity serves as brood-chamber; herein these species resemble *Phyllophorus urna*. With reference to *Synapta vivipara*, Clark* has recently furnished us with details of the development and care of the brood, after I had previously given a brief notice † of the gastrula-stage found by me in the body-cavity of this species. As regards *Chiridota rotifera*, we possess only the fragmentary observations I published by myself in 1881 ‡.

That, however, there also exists an antarctic *Chiridota* in which care of the brood is well-marked, I am now in a position to show. The species in question is *Chiridota contorta*, which was described by myself in the year 1874, and of which I have now before me a more extensive series of specimens from the Hamburg Museum (obtained by the Hamburg-Magellan Collecting Expedition). In this species I discovered a form of care of the brood hitherto unknown either among Holothurians or in the case of any other Echinoderm. For in the female animals (the sexes in this species are separate, just as I can also show to be the case in *Chiridota*

* Clark, "The Viviparous *Synapta* of the West Indies" (Zool. Anz. 1896, p. 398), and "Notes on the Life-History of *Synapta vivipara*, Erstedt" ('Journal of the Institute of Jamaica,' vol. ii. part 3, Kingston (Jamaica), 1896, pp. 278-282).

† Ludwig, "Die von Chierchia auf der Fahrt der kgl. ital. Corvette 'Vettor Pisani' gesammelten Holothurien," Zoologische Jahrbücher, ii. 1886, pp. 28-29. Clark does not refer to this publication, but, on the contrary, erroneously asserts that I described a specimen of *Synapta vivipara* as far back as 1881. My paper of the year 1881 ('Archives de Biologie,' ii. p. 41) refers not to *Synapta vivipara*, but to *Chiridota rotifera*.

‡ See previous note.

rufescens and *Chiridota Pisanii**) the genital canals themselves become receptacles for the brood, and the entire development is passed through within them. The oldest stages of the young, which through the genital canals in large numbers, are 3 millim. in length and are born through the genital aperture. They possess seven tentacles, exhibiting the same symmetrical arrangement as in the case of the young of *Chiridota rotifera* previously described by me. In their body-wall the wheel-papillæ † and the hook-shaped calcareous bodies, which are especially characteristic of the species and to the function of which Östergren ‡ has recently directed attention, are already well-developed; similarly the tentacles also are already provided with the same calcareous bodies as in the case of the adults. Among internal organs may be observed the calcareous ring, a ventral Polian vesicle, and a dorsal uncalcified stone-canal, as well as a typically coiled intestinal canal. The young lie sometimes with the anterior, sometimes with the posterior end towards the genital aperture.

In a younger stage the young are scarcely 1 millim. in length and possess but five tentacles; in the integument it is only in the three dorsal interradii that groups of wheels occur, one group in each close behind the tentacles and a second a short distance in front of the anus; the rudiments of the hook-shaped calcareous bodies of the integument, as well as of the calcareous rods in the tentacles, have only just begun to appear.

I shall endeavour to give a precise description of the young stages here alluded to of *Chiridota contorta*, which is now found to be viviparous, in my memoir upon the antarctic Holothurians collected by Dr. Michaelsen. I shall there also have an opportunity of clearing up the synonymy of the antarctic Synaptidæ (especially of *Chiridota purpurea*, Lesson, which has been misinterpreted by Studer as well as by Théel and Lampert), and, with reference to the antarctic (hermaphrodite!) *Cucumaria crocea*, which takes care of its brood, of giving a detailed account of the young forms, a large series of which I have at my disposal.—*Zoologischer Anzeiger*, Bd. xx. No. 534 (June 28, 1897), pp. 217-219.

* As to this, I have already published a note in my treatise on sea-cucumbers in Bronn's 'Classen und Ordnungen,' p. 182, so that Dendy is in error in asserting, as he has just done, that he is the first to discover a separation of the sexes in a *Chiridota* (*Ch. dunedinensis*, Parker).—Cf. Dendy, "Observations on the Holothurians of New Zealand, with Descriptions of four new Species, and an Appendix on the Development of the Wheels in *Chirodota*," Journ. Linn. Soc., Zool. vol. xxvi. 1897, p. 28.

† The development of the wheels agrees perfectly with the account which I gave in 1892 of the origin and structure of *Chiridota*-wheels in general (*Zeitschr. f. wiss. Zool.* Bd. liv. pp. 350-364, t. xvi.). Dendy needs only to look at this paper, which he has left entirely unnoticed, in order to convince himself that it contains everything that he recently communicated as new concerning the mode of formation of *Chiridota*-wheels (cf. Dendy, *loc. cit.* pp. 49-50).

‡ *Zool. Anz.* 1897, p. 154.